Third Quarter 1994 (July-September) Monitoring Report for Land Treatment

McLaren/Hart Project No. 03.0601266.000

Mobil Jalk Fee, Santa Fe Springs, California CRWQCB Monitoring and Reporting Program No. 90-148-47 [File No. 90-60-47(94)]

October 15, 1994

Prepared for: **Mobil Exploration**
10735 South Shoemaker Avenue
Santa Fe Springs, California 90670
Client City, State, and Zip

Prepared by: **McLaren/Hart Environmental Engineering Corporation**
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This project was completed under the direction of a California Registered Geologist.

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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

This report presents the results of McLaren/Hart's third quarter 1994 (July-September) land treatment cell monitoring at the Mobil Exploration & Producing U.S., Inc. (Mobil) Jalk Fee site in Santa Fe Springs, California. This report has been prepared in accordance with the requirements set forth in California Regional Water Quality Control Board-Los Angeles Region (CRWQCB) Monitoring and Reporting Program No. 90-148-47. The scope of work for this project was presented in McLaren/Hart's remedial action plan (RAP) dated December 21, 1993, and approved by the CRWQCB.

The principal objective of the land treatment program is to reduce the concentration of total recoverable petroleum hydrocarbons (TRPH) in soil transported to the land treatment cells to below 1,000 parts per million (ppm). As presented in the RAP, the soil transported to the Jalk Fee site is derived solely from properties in the Mobil Operated Santa Fe Springs Oil Field, including the Jalk Fee, DeWenter/Jordan/Green, Baker/Humble properties and Oil Well 732-C site (Figure 1). To date, two bioremediation cells (Cell #1 [large cell] and Cell #2 [small cell]) have been constructed, surveyed, and loaded with TRPH-impacted soil, three groundwater monitoring wells have been installed and sampled, and baseline soil sampling as presented in our RAP has been completed. All soil excavation activities have been completed and soil treatment was started in early May 1994. This third quarter 1994 (July-September) report presents the bioremediation cell operation, maintenance, and monitoring results from July 1994 through September 1994. Figure 2 presents the site layout.

2.0 BASELINE SAMPLING AT BIOREMEDIATION CELL

A total of 20 baseline soil samples were obtained on March 9, 1994, from the base of the treatment cells after construction of the cells and prior to loading soil into the cells. Samples were randomly selected using a random number generating routine in a programmable calculator from the grid system presented in Figures 3 and 4. The same grid was used for soil sampling of the treatment cells during bioremediation at the Jalk Fee. The soil samples were collected using a hand auger and drive sampler at approximately one-inch below ground surface to document baseline petroleum hydrocarbon concentrations underlying the treatment cells. The soil samples were analyzed for total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1 and benzene, toluene, xylenes, and ethylbenzene (BTXE) by EPA Method 8020. The analytical results from these soil samples will be compared with the results for soil samples obtained at the completion of treatment from the same sampling locations and depths to document that the treated soil did not impact the native soil underlying the treatment cell. Soil sampling protocols are presented in Appendix A.

Baseline sampling analytical results indicate petroleum hydrocarbons were present before soil was loaded into the cells. Most grid cells sampled in Cell #1 contained TRPH levels below 1,000 ppm with the exception of grid cell number 40 (which was non-detect). Grid cell numbers 4, 21, and 30 had petroleum hydrocarbon levels greater than 1,000 ppm (10,000 ppm, 1,100 ppm, and 4,300 ppm, respectively). The average TRPH concentration of the samples collected from Cell #1 was 1,317 ppm.

Most grid cells sampled in Cell #2 contained some amounts of petroleum hydrocarbons with the exception of grid cell number 80 (which was non-detect). All grid cells sampled in Cell #2, however, had TRPH levels less than 1,000 ppm. The highest TRPH level in Cell #2 was detected in grid cell number 57 at 800 ppm.

The average TRPH concentration of the samples collected from Cell #2 was 427 ppm. All samples from Cells #1 and #2 were also analyzed for BTXE. All samples were below the reporting limit of 10 parts per billion (ppb). Analytical results of baseline sampling are presented in Table 1. Soil sample analytical results and chain-of-custody forms are presented in Appendix B.

3.0 SOIL EXCAVATION AND CONFIRMATORY SAMPLING

Soil excavation activities were completed at the Jalk Fee, DeWenter/Jordan/Green, Baker/Humble, and Mobil Oil Well 732-C sites. The volume of soil from each location containing TRPH above 1,000 parts per million includes:

Location	Volume	Dates
Jalk Fee	720 cubic yards	March 10 and 16, 1994
DeWenter/Jordan/Green	23,000 cubic yards	March 14 and May 5, 1994
Baker/Humble	8,950 cubic yards	May 6 and June 3, 1994
Mobil Oil Well 732-C	1,600 cubic yards	May 11 and July 25, 1994

Soil excavated from the properties was loaded into end-dump trucks and transported to the bioremediation cells. To date, the soil has been spread evenly into three 18-inch lifts at cell #1 (Figure 3, large cell) and two 18-inch lifts at cell #2 (Figure 4, small cell). The estimated total volume of soil in the two cells is currently approximately 34,600 cubic yards.

As part of the excavation and confirmatory sampling program, soil samples were obtained from the base and sidewalls of the excavations at each of the properties to verify that all soil containing TRPH above 1,000 ppm was removed. All soil samples were analyzed for TRPH by EPA Method 418.1 and selected soil samples were analyzed for BTXE by EPA Method 8020. All analyses were conducted by a California EPA hazardous waste certified mobile analytical laboratory. The results of these sampling programs have been documented and reported to the RWQCB.

Prior to excavation, the properties were cleared and grubbed. All metal piping, concrete blocks, and other oversized material greater than approximately six inches in diameter were segregated from

contaminated soil and clean overburden soil both before and after transport to the Jalk Fee site. Clean overburden soil was stockpiled separately and was used to backfill the Jalk Fee and Baker/Humble properties. The DeWenter/Jordan/Green property and the Santa Fe Springs Oil Well 732C site will be backfilled with remediated soil from the two cells. The locations of the excavations were measured relative to the site boundaries using a measuring wheel and recorded in a field notebook.

4.0 GROUNDWATER MONITOR WELL SAMPLING

Three groundwater monitor wells were installed at the Jalk Fee between January 19 and 21, 1994, in accordance with the RWQCB-Los Angeles Region Waste Discharge Requirements (WDR) permit for the project (Figure 2). The wells consist of one upgradient monitor well (MMW-3) and two downgradient monitor wells (MMW-4 and MMW-5). Two wells (MMW-1 and MMW-2) not associated with the Jalk Fee site, were installed on January 19 and 20, 1994, respectively. MMW-1 is located on the Mobil DeWenter/Jordan/Green property and MMW-2 is located at the Mobil Baker/Humble property (Figure 6 and 7, respectively). Both wells were installed to determine whether past oil production activities have impacted groundwater beneath the sites. All five wells were sounded, developed, and sampled on September 16, 1994, respectively. The results from the groundwater level sounding indicated that groundwater in the aquifer underlying the property (the Exposition Aquifer) flows to the southwest at a hydraulic gradient of 0.007 feet/foot as shown in Figure 5. Table 2 provides the groundwater monitor well construction details.

5.0 GROUNDWATER ANALYTICAL RESULTS

The groundwater samples obtained from the five wells were sampled for TRPH by EPA Method 8015 modified and volatile organic compounds (VOCs) by EPA Method 624. The three wells from the Jalk Fee site were also sampled for pH by EPA Method 150.1, and total dissolved solids (TDS) by EPA Method 160.1. Tables 3 and 4 present the positive groundwater sample analytical results from the first, second, and third quarter sampling events for the Jalk Fee site.

TRPH was not detected in the three wells at the Jalk Fee site. Groundwater pH levels ranged from 6.9 to 7.1 and TDS concentrations ranged from 1,200 to 1,700 ppm. Trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE) concentrations in all three wells remained relatively unchanged from the second quarter. 1,1-DCE was detected at 3 ppm (first quarter), <5 ppm (second quarter) and <5 (third quarter), respectively. TCE decreased in each well from 24 to 12 ppb, 16 to 6 ppb, and 100 to 82 ppb, respectively from last quarter. Toluene was detected in MMW-3 only, at a concentration of 3 ppb. Tetrachloroethene (PCE) was detected in MMW-5 only, and decreased from 930 ppb from last quarter to a concentration of 830 ppb. Total xylenes were detected in MMW-3 at 6 ppb. In well MMW-5, methylene chloride was detected at 23 ppb. No other VOCs were detected.

TRPH was not detected in either of the wells at the DeWenter/Jordan/Green (MMW-1) or Baker/Humble (MMW-2) site. Groundwater pH levels were detected at 7 and 6, respectively. TDS concentrations were detected at 1,100 and 1,900 ppm, respectively. 1,1-DCE was detected in MMW-2 at a concentration of 110 ppb. TCE concentrations were detected in well MMW-1 at 11 ppb. PCE was detected in MMW-1 at 5 ppb. Vinyl chloride, 1,2-Dichloroethane, and benzene were detected in MMW-2 at concentrations of 33 ppb, 2 ppb, and 57 ppb, respectively. No other VOCs were detected in either well.

The groundwater sampling protocols are presented in Appendix A. The groundwater sample analytical results and chain-of-custody forms are presented in Appendix C.

6.0 BIOREMEDIATION CELL OPERATION AND MAINTENANCE

Operation and maintenance of the treatment cells included weekly visual inspections of the bioremediation cells, tilling (stabilization) of the soil piles and watering using a mobile water truck, and addition and mixing of nutrients. The soil was tilled weekly using an SS250 soil stabilizer. The stabilizer pulverized and thoroughly mixed the soil to promote aeration, the mixing of nutrients, and biodegradation. Nutrients were added to the soil on a weekly basis and thoroughly mixed using the soil stabilizer. Downslope storm water runoff collection trenches were inspected weekly to determine whether storm water runoff had ponded and whether breeches in the earthen berm retaining walls had occurred. During the July - September quarter, there was no evidence of surface water or breaches in the earthen berm.

A standard mixture of agricultural nutrients consisting of water-soluble ammonium sulphate ($N_2H_4(_2SO_4)$) and ammonium phosphate ($NH_4(_2HPO_4)$) was added weekly to each bioremediation cell. Five hundred pounds of ammonium sulphate were added weekly to the 3.17 acre Cell #1, and 250 pounds of ammonium sulphate were added weekly to the 1.30 acre Cell #2. Phosphorous levels were sufficient from the last quarter. Therefore, ammonium phosphate was not added during this quarter to either of the cells. A total of 750 pounds ammonium sulphate was added weekly for the two cells combined. The ammonium sulphate fertilizer contains 21 percent nitrogener. Based on these nitrogen percentages, a total of 105.0 pounds of nitrogen was placed in Cell #1 on a weekly basis, and 52.5 pounds of nitrogen was placed in Cell #2 on weekly basis; a total of 157.5 pounds of nitrogen were added to the two cells combined on a weekly basis.

7.0 BIOREMEDIATION CELL SAMPLING

Soil samples were collected weekly from each of the two bioremediation cells and analyzed for the constituents required in the RWQCB-Los Angeles Region WDR permit. Sample grid cell locations within Cell #1 and Cell #2 were randomly selected using a random number generating routine in a programmable calculator. One grid cell location from each bioremediation cell was analyzed every week for various "bioparameters". The "bioparameters" analysis analyzed the following: pH, ammonium nitrogen, nitrate nitrogen, orthophosphate, moisture content, hydrogen oxidizing microbial population, and total heterotrophic microbial population.

During July 7 through August 25, 1994, a total of 6 to 7 randomly selected grid cell locations from Cell #1 and 3 to 4 locations from Cell #2 were sampled every two weeks and analyzed for TRPH by EPA Method 418.1 in accordance with the WDR permit. Beginning September 1, sampling was completed for the first 18-inch layer of Cell #2, at which time, the number of sampling locations for TRPH for Cell #1 increased to 10. Two randomly selected grid cell locations from Cell #1 and Cell #2 were sampled once a month from each cell and analyzed for total organic carbon (TOC) by EPA Method 150.1. The objective of the sampling is to monitor the effectiveness of biological treatment and to identify the parameters that affect the rate of biodegradation. The sampling data is used to optimize the performance of the biological treatment at the site.

In accordance with the WDR permit, soil samples were analyzed quarterly for VOCs and semi-volatile organic compounds (SVOCs) by EPA Methods 8020 and 8270 and organic lead by EPA Method 6010/7000. The composite samples for these analyses were from four randomly selected grid cells. All laboratory analytical Quality Assurance/Quality Control protocols for the soil sampling and analyses will be completed in accordance with our RAP.

8.0 BIOREMEDIATION CELL SOIL SAMPLING ANALYTICAL RESULTS

LARGE CELL (#1)

Monitoring of TRPH, nutrient, moisture, and microbial plate counts at the large bioremediation cell was initiated on June 9, 1994. This third quarter report includes the analytical results for the soil samples collected from July 7 to September 22, 1994 (a 70 day period). The average TRPH level decreased from a high of 1,885 ppm to 618 ppm, then increased to 967 ppm. This apparent increase in TRPH levels could be attributed to the fact that one of the samples collected during the last sampling round was collected from a "TRPH hot spot" (3200 ppm TRPH). Soil pH levels varied within a narrow range of 7.3 to 8.7. Moisture levels ranged from 5.2% to 15.9%, averaging 9.14%. Total nitrogen and phosphorous levels fluctuated throughout the quarter. The cell's microbial population fluctuated throughout the period. This data indicates that an initial adjustment period was required for the microbes to metabolize the increased nutrient and moisture levels before the microorganisms could effectively begin regenerating in number and breaking down the hydrocarbons. It is also not uncommon for there to be an apparent increase in the TRPH levels due to the production of surfactants by the microorganisms.

As required for each quarterly sampling by the California Regional Water Quality Control Board, four samples were collected and composited into one sample and analyzed for EPA Methods 8020 (VOCs), 8270 (SVOCs), and 6010/7000 (CAM Metals). VOCs and SVOCs were not detected in the sample. Lead was detected at 11 ppm which is below CAM Title 22 Total Threshold Limit Concentration (TTLC) of 50 ppm and 10 times the Soluble Threshold Limit Concentrations (STLCs).

The analytical results for TRPH is presented in Table 6. The analytical results for pH, nitrogen, phosphorous, moisture content, and microorganism plate counts are presented in Table 7. Graphs of TRPH and total heterotrophic plate counts versus time, total nitrogen and orthophosphate versus time, and moisture content versus time are presented in Figures 8, 9, and 10, respectively.

SMALL CELL (#2)

Monitoring of TRPH, nutrient, moisture, and bioparameter levels of the small bioremediation cell was initiated on May 4, 1994. This third quarter report includes the analytical results for the soil samples collected from July 7 to September 22, 1994 (a 70 day period). It appears that the average TRPH levels decreased from 780 ppm to 490 ppm, but increased to 803 ppm during the last 7 days. This apparent increase in average TRPH levels is attributed to the fact that one of the samples collected during the last sampling round was collected from a previously unsampled "TRPH hot spot" (1,500 ppm TRPH). In addition, the increase in the TRPH levels can be partially attributed to the production of surfactants by the microorganisms, which the microorganisms produce to increase the solubility of the organic compounds. The pH levels ranged from 7.6 to 8.1. Moisture levels ranged from 5.8% to 11%, averaging 7.57%. Total nitrogen and phosphorous levels fluctuated throughout the 70 day period. The cell's microbial population fluctuated throughout the period.

VOCs and SVOCs were not detected in the sample. Lead was detected at 13 ppm which is below CAM Title 22 Total Threshold Limit Concentration (TTLC) of 50 ppm and 10 times the Soluble Threshold Limit Concentrations (STLCs).

The TRPH analytical results and the pH, nutrient, moisture content, and microorganism plate count analytical results are presented in Tables 8 and 9, respectively. Graphs of TRPH and total heterotrophic plate counts versus time, total nitrogen and orthophosphate versus time, and moisture content versus time are presented in Figures 11, 12, and 13, respectively.

9.0 CONCLUSIONS

Based on field observations and analytical results from the first and second quarters, the following conclusions have been made:

(1) Suitable conditions for soil bioremediation have been achieved during the past quarter in each of the bioremediation cells. Soil pH levels are within an acceptable range for bioremediation and well developed hydrocarbon oxidizers and total heterotrophic microbial populations have been established at both bioremediation cells.

(2) Once the microbial population became established at both of the bioremediation cells significant reductions in TRPH concentrations were achieved. All grid cells in Cell #2 have been sampled and average below 1,000 ppm. Removal of the first 18-inches of soil has been verbally approved by Manju Venkatanarayana of the California Regional Water Quality Control Board. Written approval from the RWQCB is expected in the near future.

(3) Groundwater analytical results for the Jalk Fee site indicate that VOC concentrations have decreased since the last sampling round. The groundwater analytical results indicate that PCE contamination is migrating onto the site.

(4) Groundwater analytical results for the Baker/Humble site indicate that 1,1-DCE, and benzene contamination is detected in the groundwater at concentrations of 110 ppb and 57 ppb, respectively.

10.0 CLOSURE

Based on the results of this investigation, the following work is recommended:

(1) The average TRPH levels for the first lift of Cell #1 is below 1,000 ppm, although the last set of samples showed an increase from 618 ppm to 967 ppm. Confirm average TRPH levels are below 1,000 ppm and with RWQCB approval, the top 18 inches of soil will be removed and loaded into the excavation at the DeWenter/Jordan/Green property. Bioremediation treatment of the remaining lifts of soil will subsequently be initiated.

(2) As a general rule, supplemental nutrients such as nitrogen and phosphorus are added to soil to obtain a simple ratio of carbon:nitrogen:phosphorous of 100:10:1. However, there is a great deal of potential variability in this ratio due to environmental conditions including soil moisture levels and other empirical factors. Typically, optimal rates of bioremediation can be obtained with the ratio of carbon:nitrogen ranging anywhere from about 10:1 to 10:0.3.

The total volume of soil within the biotreatment cell is estimated to be about 7,000 cubic yards or about 20,000,000 lbs. The average concentration of TRPH at the start of bioremediation was about 1,000 ppm. Therefore, the total amount of TRPH to be remediated is about 20,000 lbs, most of which is carbon. Using the optimal carbon:nitrogen:ratios of 10:1 and 10:0.0.3, the calculated total requirement for nitrogen would range from 2,000 lbs to about 700 lbs. To date, about 1,600 lbs of nitrogen have been added to the biotreatment cell. Thus, based on general guidelines, the rate at which nitrogen is added during subsequent treatment periods may be reduced as long as measured nitrogen levels do not fall below adequate levels for bioremediation to be effective. Soil moisture must be maintained at adequate levels (10-15%) in order to utilize nitrogen efficiently. In an effort to maintain adequate levels during hot Summer months, the volume of water sprayed on each cell was increased from one day of watering to two days per week. Phosphorus levels are not as critical as nitrogen and appear to be within adequate range.

(3) Remove the top 18 inches of soil from Cell #2 and load soil into Santa Fe Spring Oil Well 732C and DeWenter/Jordan/Green excavations. Bioremediation of the remaining lift will be subsequently be initiated.

The attached figures, tables, and appendices complete this report. Should you have any questions, please contact Tabb W. Bubier at (714) 752-3204 or Hassan Amini at (714) 752-3208.

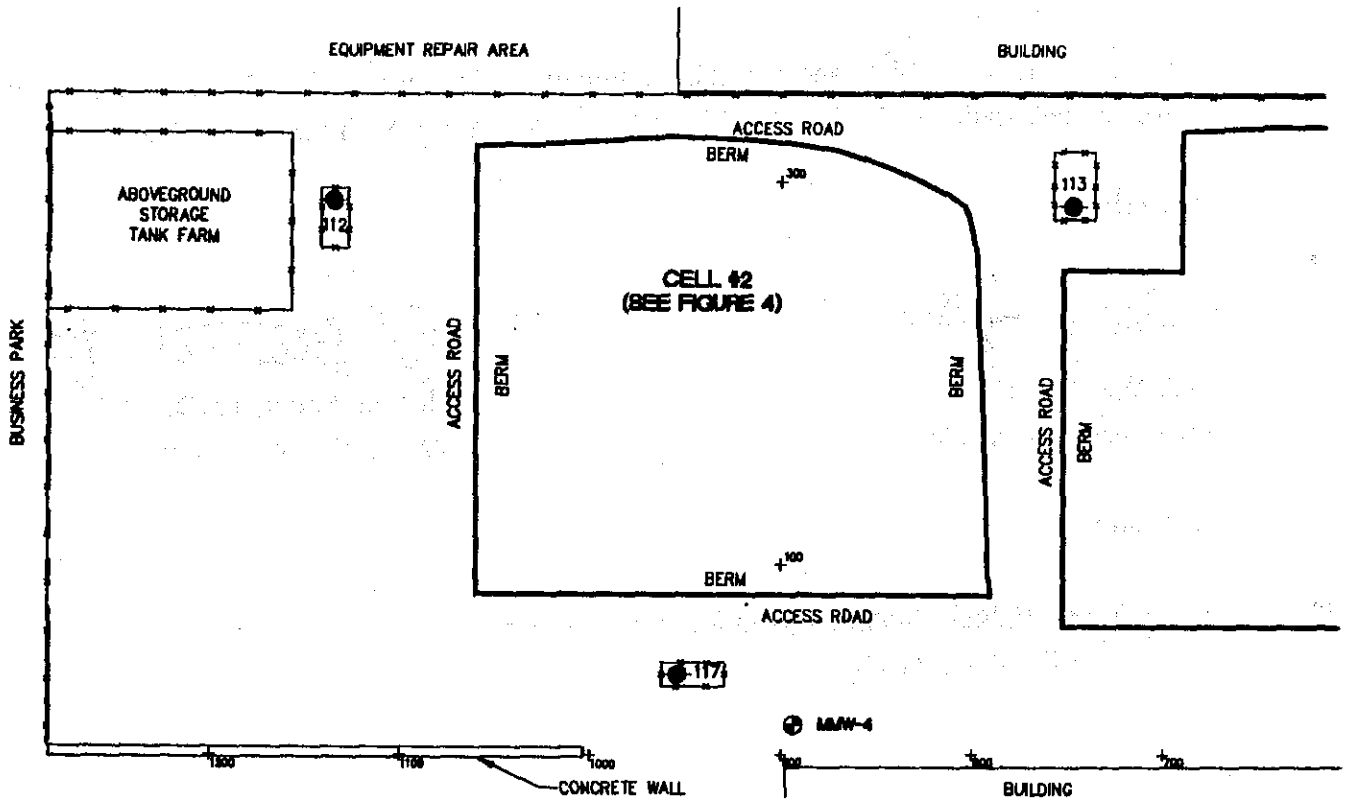
Sincerely,

Tabb W. Bubier
Supervising Geoscientist

Hassan Amini, Ph.D., R.G.
Principal Geoscientist

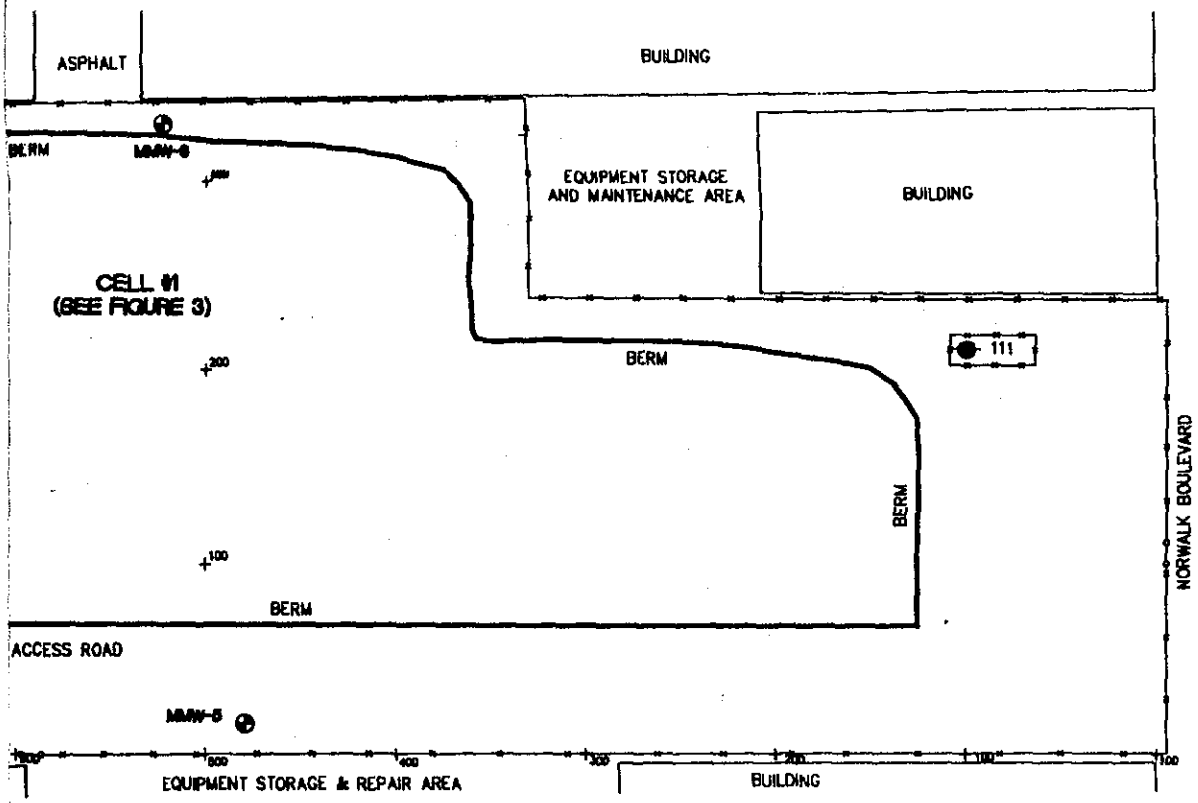
Enclosure

cc: T.M. Walker, Mobil Exploration and Producing
J. Hill, McLaren/Hart



LEGEND

- APPROXIMATE AREA OF BIOREMEDIATION CELL (4.37 ACRES)
- MW-4 GROUNDWATER MONITOR WELL LOCATION
- NOTES: SITE MAP MODIFIED FROM LEVINE-FRICKE (1991c). AREA ESTIMATIONS CONCERNING ACTIVE OIL WELLS AND EXISTING TANK FARM ARE BASED ON VISUAL OBSERVATIONS FROM LEVINE-FRICKE (1991c).
- 117 OPERATIONAL OIL WELL
- 900+ SURVEYED MEASURED INTERVALS (100 FOOT)
- CHAIN LINK FENCE
- GATE



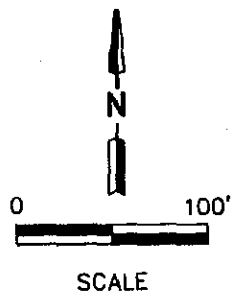


FIGURE 2
BIOREMEDIATION TREATMENT
CELL LOCATION
MOBIL JALK FEE PROPERTY
10607 NORWALK BOULEVARD
SANTA FE SPRINGS, CA

DRAWN BY K.M./V.M.	DATE 10/5/94	UNITS OF DIMENSIONS	FRACT.
CHECKED BY S.C.	DATE 10/5/94	UNLESS OTHERWISE SPECIFIED	DEC. ANG.
APPROVED BY T.S.	DATE 10/5/94	DRAWING NUMBER 8-94_FIG2	
SCALE	REVISION		

FIGURE 3
SAMPLE GRID LAYOUT
CELL #1
MOBIL JALK FEE PROPERTY
10607 NORWALK BOULEVARD
SANTA FE SPRINGS, CAILIFORNIA

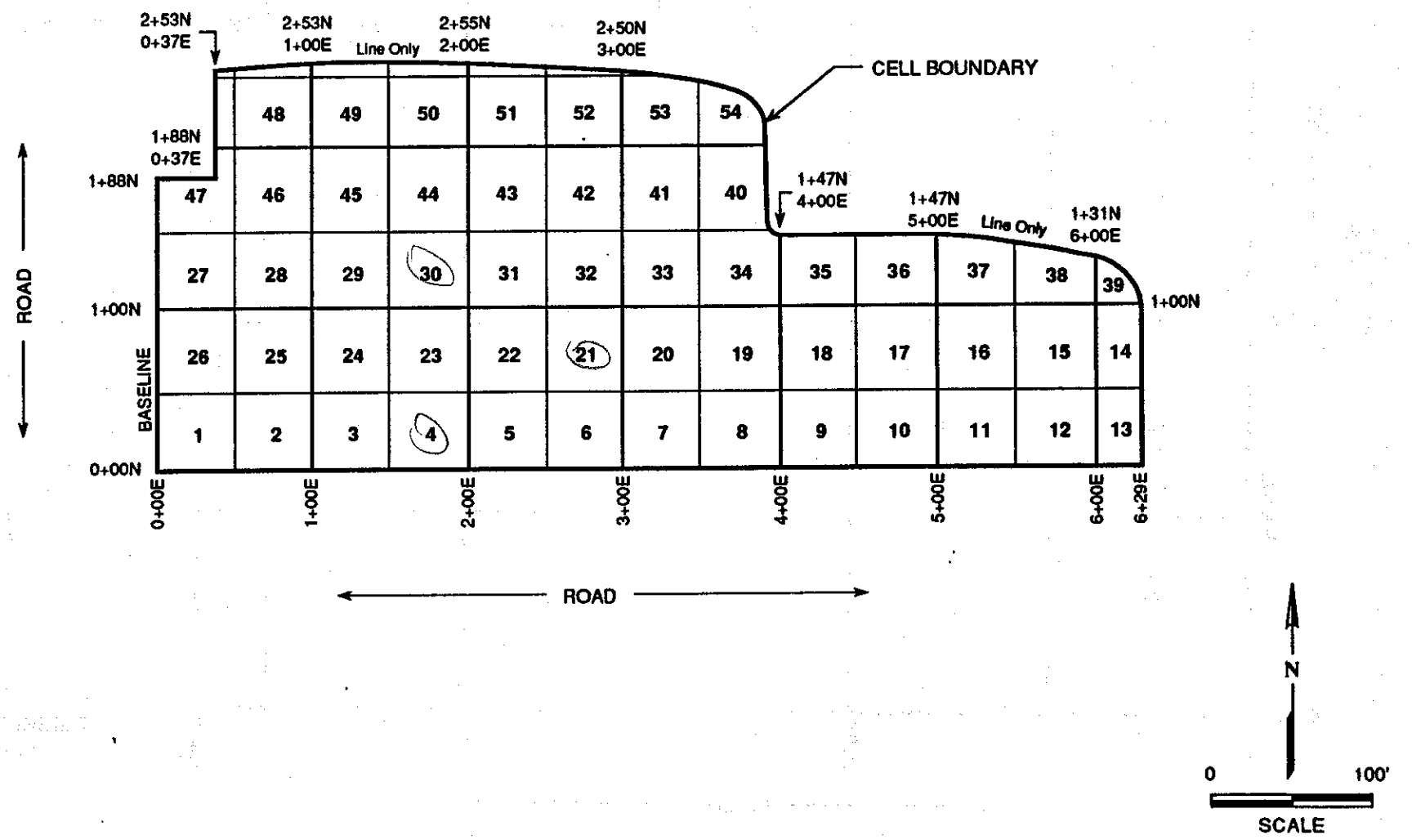


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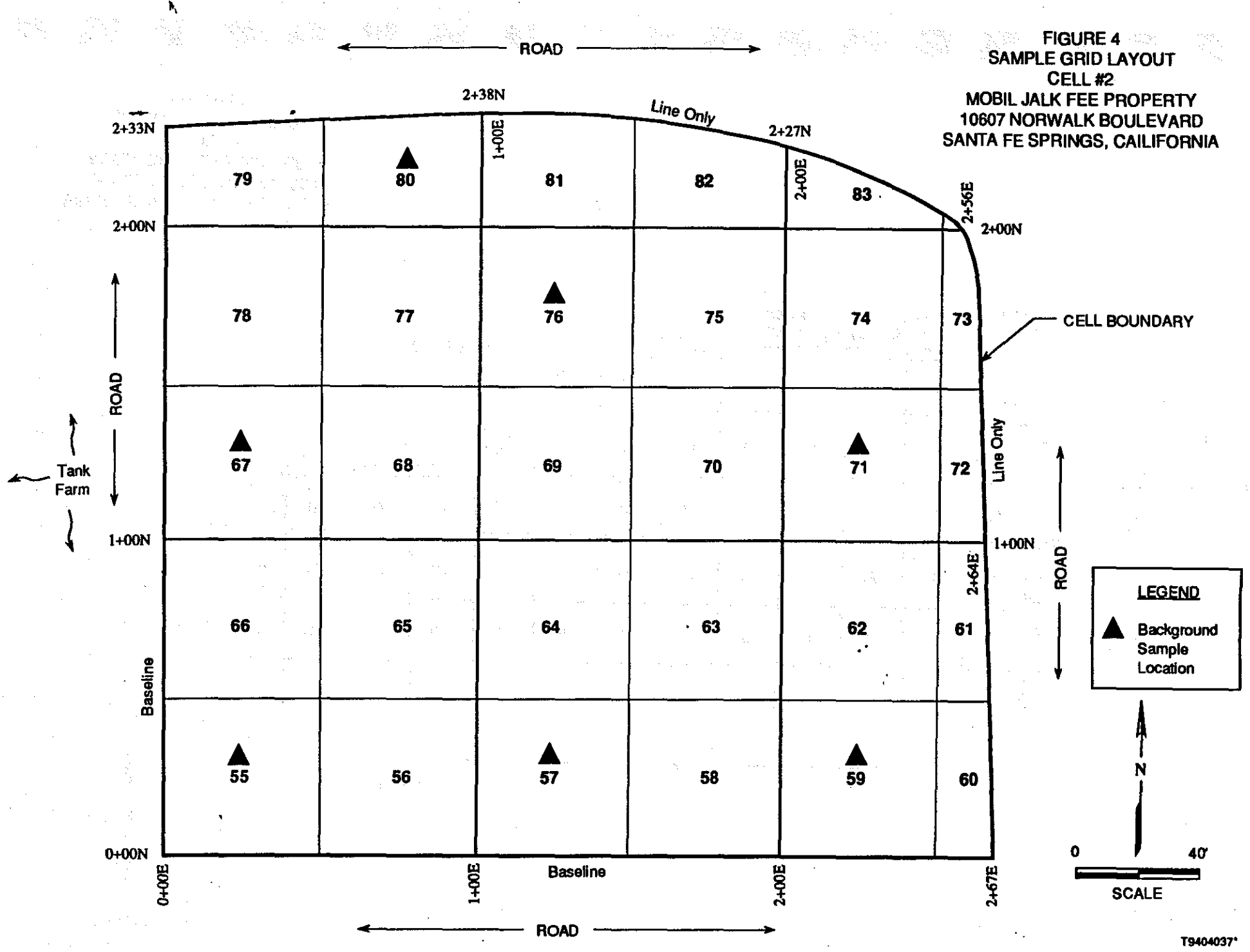
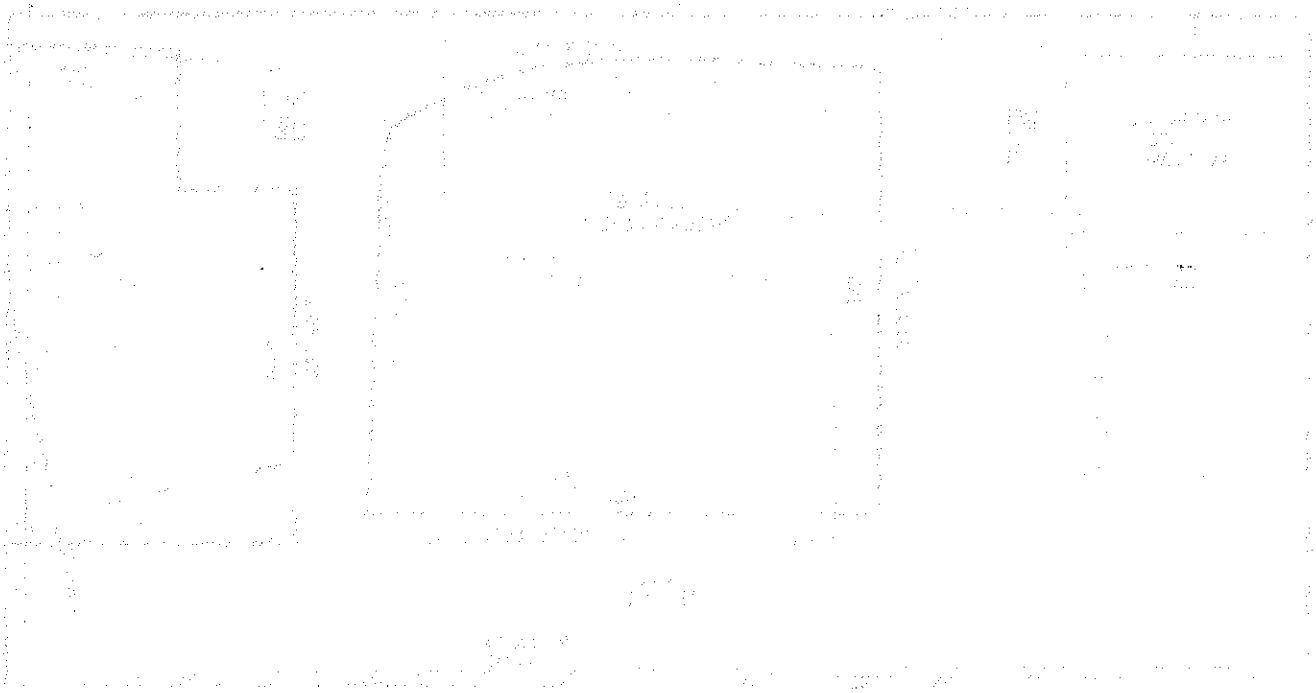
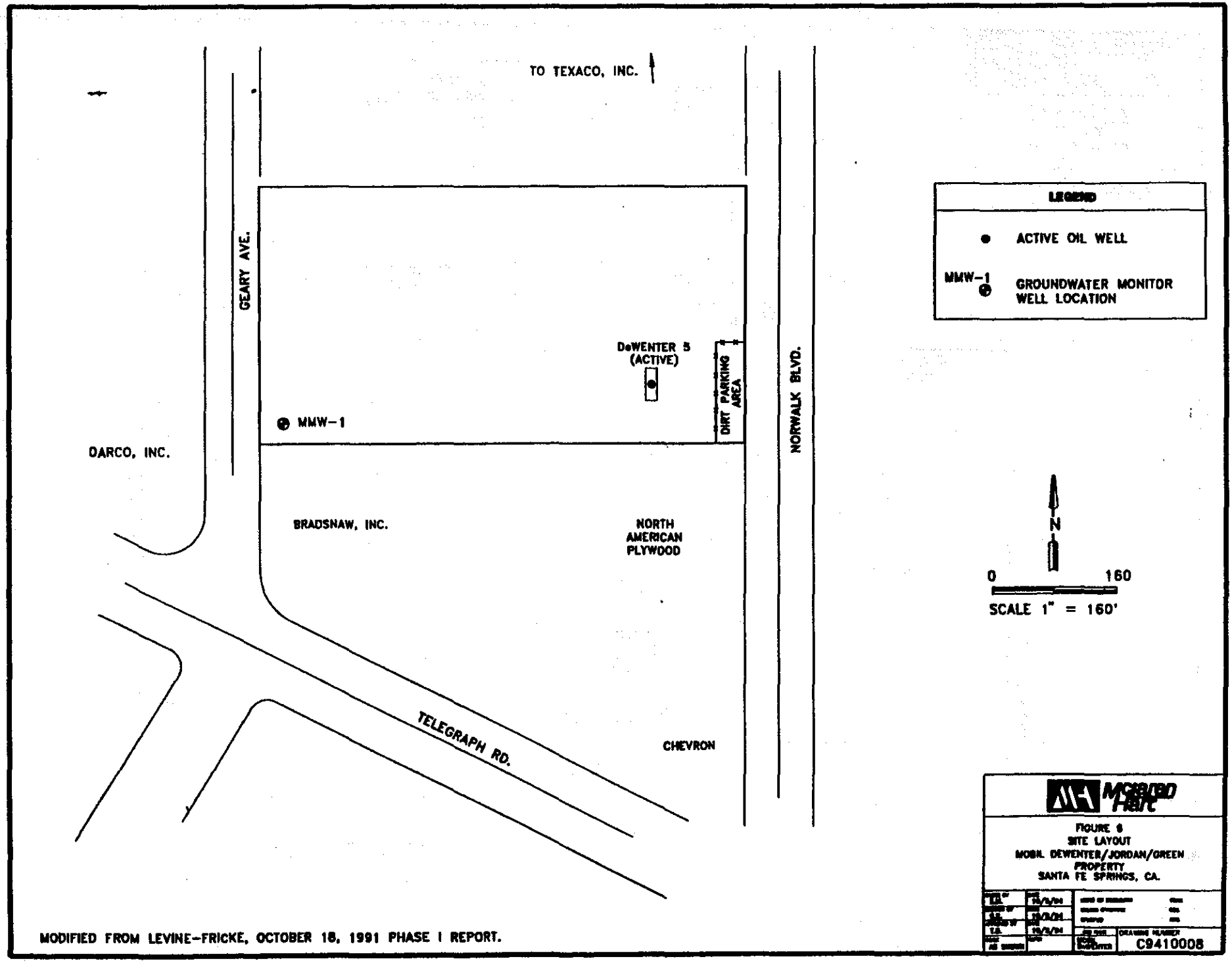
FIGURE 4
SAMPLE GRID LAYOUT
CELL #2
MOBIL JALK FEE PROPERTY
10607 NORWALK BOULEVARD
SANTA FE SPRINGS, CAILIFORNIA







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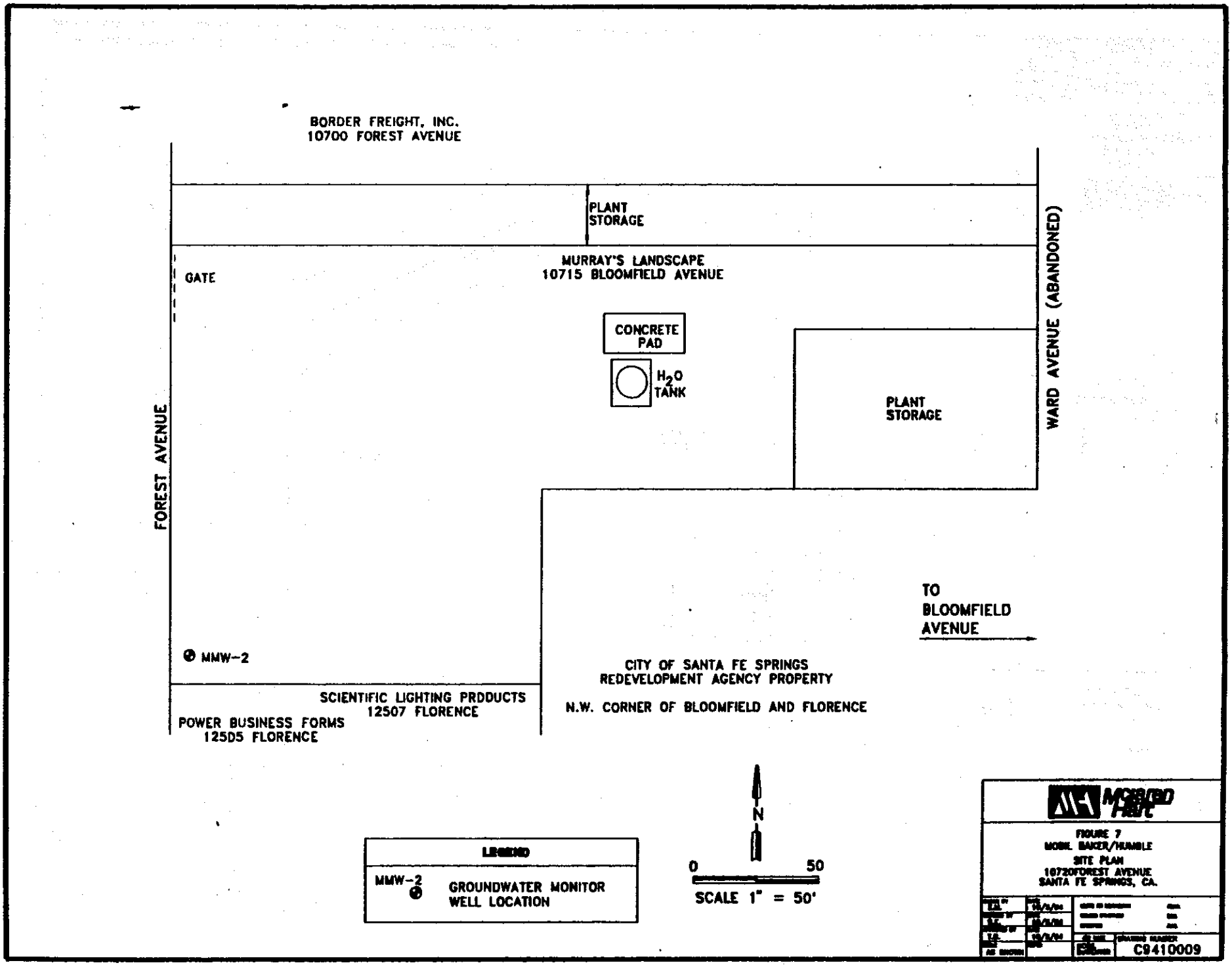
BORDER FREIGHT, INC.
10700 FOREST AVENUE
PLANT STORAGE
MURRAY'S LANDSCAPE
10715 BLOOMFIELD AVENUE
GATE
CONCRETE PAD
H_2O TANK
PLANT STORAGE
WARD AVENUE (ABANDONED)
FOREST AVENUE
TO BLOOMFIELD AVENUE
MMW-2
CITY OF SANTA FE SPRINGS
REDEVELOPMENT AGENCY PROPERTY
N.W. CORNER OF BLOOMFIELD AND FLORENCE
SCIENTIFIC LIGHTING PRDDUCTS
12507 FLORENCE
POWER BUSINESS FORMS
12505 FLORENCE
LEGEND
MMW-2 GROUNDWATER MONITOR WELL LOCATION
N
0
50
SCALE 1" = 50'
FIGURE 7
MOBIL BAKER/HUMBLE
SITE PLAN
10720FOREST AVENUE
SANTA FE SPRINGS, CA.
C9410009

Figure 8
Mobil Jalk Fee Property
Total Recoverable Petroleum Hydrocarbon (TRPH) and
Total Heterotrophic Plate Counts (THPC) vs. Time
Cell #1

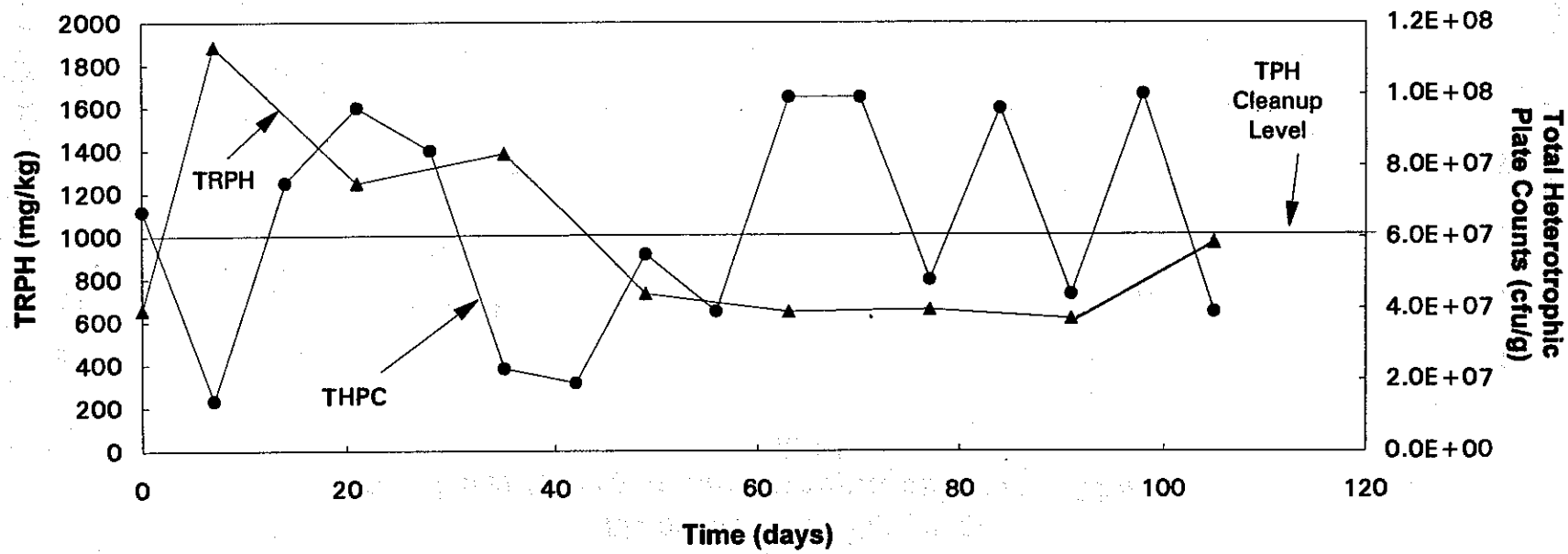

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Figure 9
Mobil Jalk Fee Property
Total Nitrogen and Orthophosphate vs. Time
Cell #1

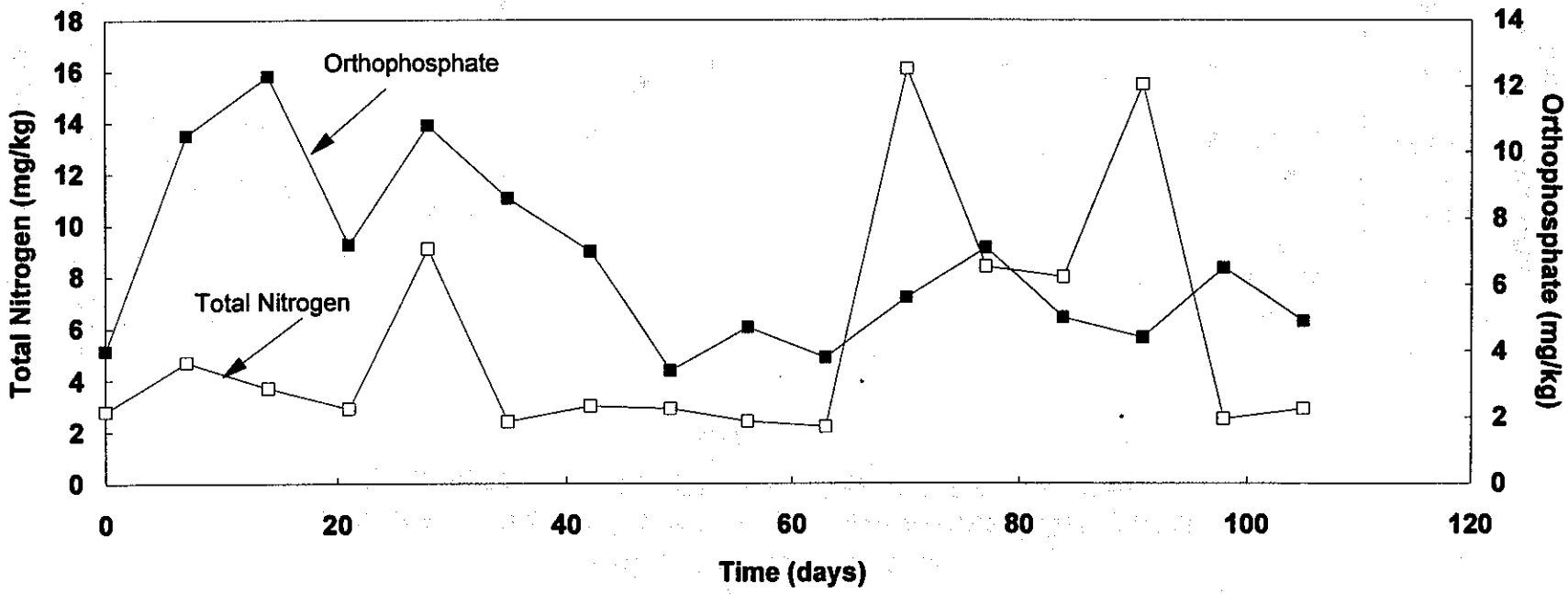

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Figure 10
Mobil Jalk Fee Property
Moisture vs. Time
Cell #1

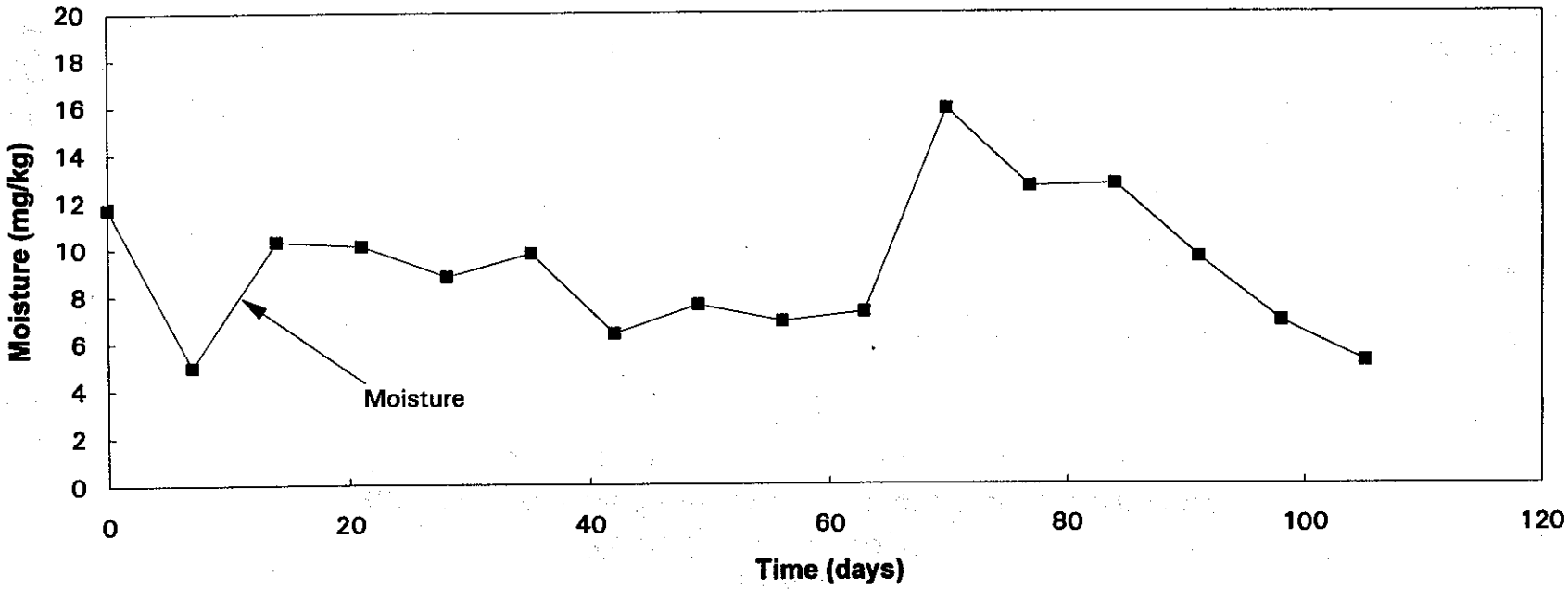

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Figure 11
Mobil Jalk Fee Property
Total Recoverable Petroleum Hydrocarbon (TRPH) and
Total Heterotrophic Plate Counts (THPC) vs. Time
Cell #2

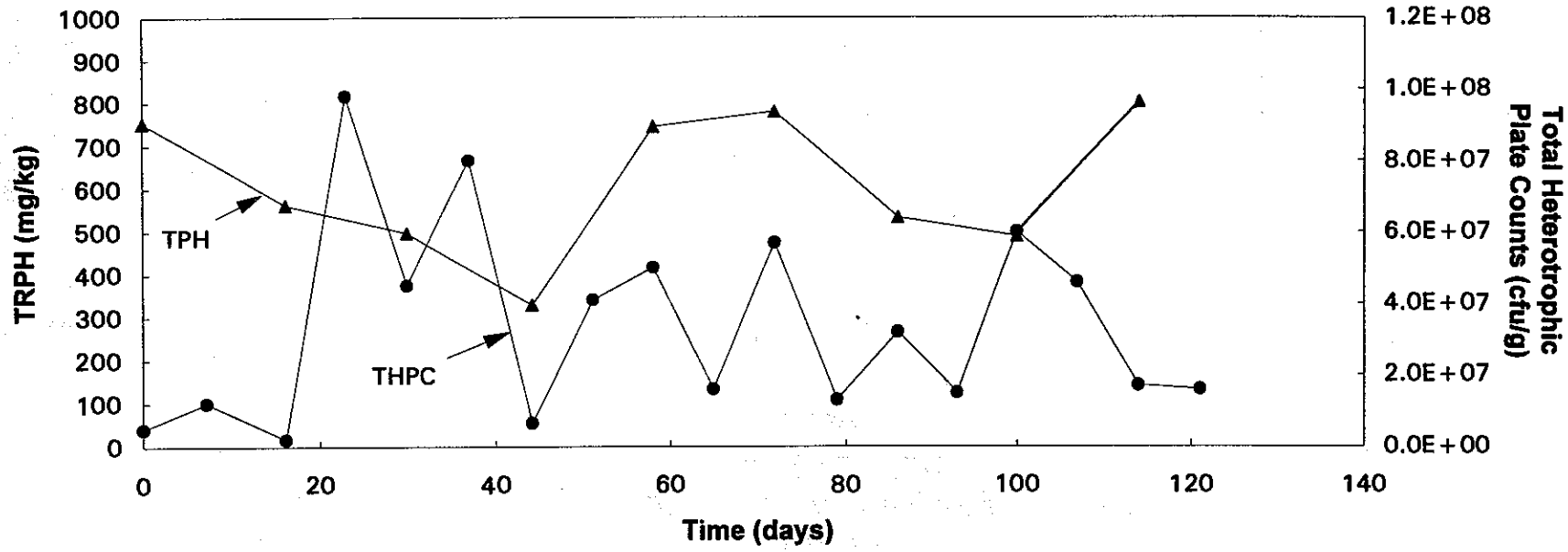

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Figure 12
Mobil Jalk Fee Property
Total Nitrogen and Orthophosphate vs. Time
Cell #2

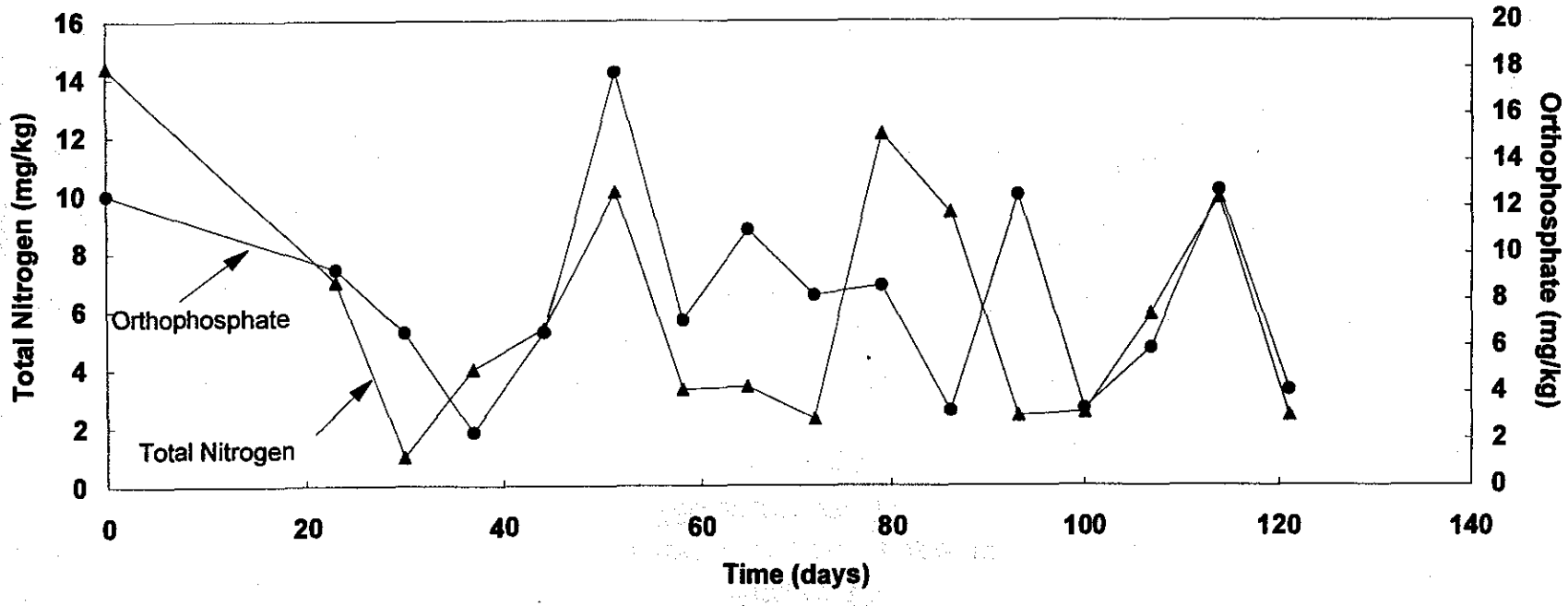

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Figure 13
Mobil Jalk Fee Property
Moisture vs. Time
Cell #2

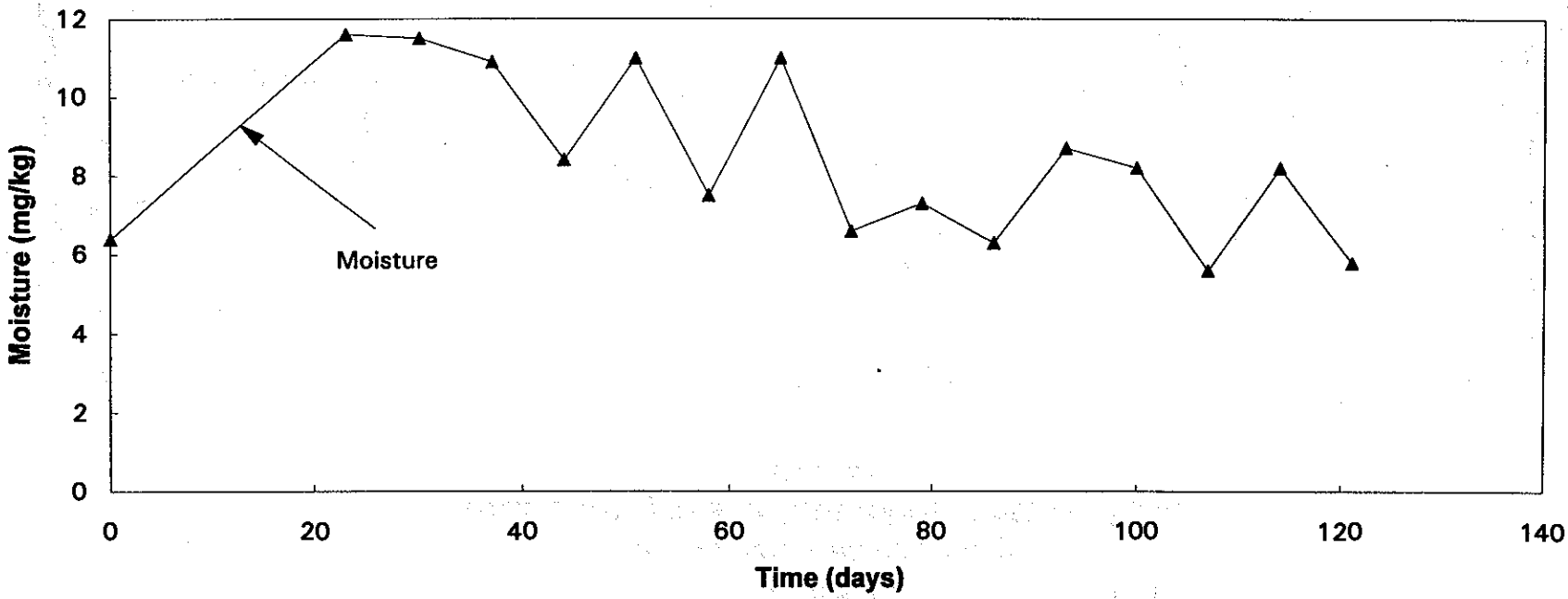

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TABLE 2
SUMMARY OF GROUNDWATER ELEVATION DATA
MOBIL DEWENTER/JORDAN/GREEN, AND BAKER/HUMBLE, AND JALK FEE,
SANTA FE SPRINGS, CALIFORNIA

Monitoring Well	Date	Screened Interval (ft. below grade)	Top of Casing Elevation (ft.)	Depth to Groundwater (ft.)	Groundwater Elevation (ft. above Mean Sea Level)
MMW-1	9/16/94	50-95	135.80	53.74	82.06
MMW-2	9/16/94	75-95	141.19	75.30	65.89
MMW-3	3/1/94	62-92	134.26	65.56	68.70
	6/22/94			63.08	71.18
	9/16/94			64.34	69.92
MMW-4	3/1/94	60-105	131.40	65.04	66.36
	6/22/94			62.73	68.67
	9/16/94			64.32	67.08
MMW-5	3/1/94	61-106	133.38	66.96	66.42
	6/22/94			64,45	68.93
	9/16/94			65.61	67.77

TABLE 1
POSITIVE BASELINE SOIL SAMPLE ANALYTICAL RESULTS
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) IN PARTS PER MILLION (PPM)
MOBIL JALK FEE, SANTA FE SPRINGS, CALIFORNIA
MARCH 9, 1994

Cell Number	Grid Cell Designation	TRPH (EPA Method 418.1)
1	2	360
	4	10000
	6	53
	12	72
	15	850
	17	340
	21	1100
	25	170
	27	170
	30	4300
	40	<50
	43	250
	46	120
2	55	450
	57	800
	59	680
	67	460
	71	250
	76	300
	80	<50

Note: Samples were also analyzed for benzene, toluene, xylenes, and ethylbenzene (BTXE) using EPA Method 8020. All samples were below the reporting limit (10 parts per billion) for BTXE.

Table 9
Mobil Jalk Fee
Cell #2
pH, Nutrient, Moisture Content,
and Microrganism Plate Count Soil Sample Analytical Results

Date	Days	Grid Cell Designation	pH	NH4-N (mg/kg)	NO3-N (mg/kg)	Total Nitrogen (mg/kg)	Ortho-Phosphate-P (mg/kg)	Moisture Content (%)	Hydrogen Oxidizing Population (mpn/g)	Total Heterotrophic Plate Count (cfu/g)
5/4/94	0	composite: 56,63,67,72	7.9	6.1	8.3	14.4	12.5	6.4	2.20E+04	4.9E+06
5/11/94	7	69	na	na	na	na	na	na	2.30E+04	1.2E+07
5/19/94	16	55	na	na	na	na	na	na	4.90E+03	2.0E+06
5/26/94	23	60	8.4	6.5	0.5	7	9.3	11.6	1.10E+05	9.8E+07
6/2/94	30	62	7.9	0.5	0.5	1	6.6	11.5	2.20E+05	4.5E+07
6/9/94	37	65	7.8	2.3	1.7	4	2.3	10.9	1.10E+03	8.0E+07
6/16/94	44	61	7.7	4.3	1.1	5.4	6.6	8.4	1.40E+05	6.5E+06
6/23/94	51	80	8	3.3	6.8	10.1	17.8	11	4.90E+04	4.1E+07
6/30/94	58	76	7.8	2	1.3	3.3	7.1	7.5	4.90E+04	5.0E+07
7/7/94	65	74	7.8	2.9	0.5	3.4	11	11	2.40E+04	1.6E+07
7/14/94	72	56	7.6	1	1.3	2.3	8.2	6.6	1.10E+04	5.7E+07
7/21/94	79	78	8.1	4.3	7.8	12.1	8.6	7.3	7.90E+03	1.3E+07
7/28/94	86	83	7.7	5.5	3.9	9.4	3.2	6.3	3.30E+04	3.2E+07
8/4/94	93	66	7.8	1	1.4	2.4	12.5	8.7	4.90E+04	1.5E+07
8/11/94	100	58	7.9	1.1	1.4	2.5	3.3	8.2	3.50E+04	6.0E+07
8/18/94	107	68	7.9	4.1	1.8	5.9	5.9	5.6	2.40E+04	4.6E+07
8/25/94	114	59	7.7	3.8	6.1	9.9	12.7	8.2	7.90E+03	1.7E+07
9/1/94	121	75	7.9	1	1.4	2.4	4.1	5.8	4.90E+04	1.6E+07
9/8/94	128	na	na	na	na	na	na	na	na	na
9/15/94	135	na	na	na	na	na	na	na	na	na
9/22/94	142	na	na	na	na	na	na	na	na	na

na: sample not analyzed

Table 8
Mobil Jalk Fee
Cell #2
Total Recoverable Petroleum Hydrocarbon
in parts per million

Grid Cell	4-May-94	19-May-94	2-Jun-94	16-Jun-94	30-Jun-94	14-Jul-94	28-Jul-94	11-Aug-94	25-Aug-94
55		200							490
56	200					640			
57			300						
58			450					320	
59		390							420
60			300						
61				320					
62			350						
63	50		500						
64		1200							
65					480				
66			1400						
67	1600					500			
68					760			390	
69					1200				1500
70			50						
71				150					
72	460						99		
73			580						
74		720							
75						1200		760	
76					540				
77	210			50					
78			800						
79			240						
80		300							
81							970		
82	2000			800					
83							530		
Average	753	562	497	330	745	780	533	490	803

Table 7
Mobil Jalk Fee
Cell #1
pH, Nutrient, Moisture Content,
and Microrganism Plate Count Soil Sample Analytical Results

Date	Days	Grid Cell Designation	pH	NH4-N (mg/kg)	NO3-N (mg/kg)	Total Nitrogen (mg/kg)	Ortho-Phosphate-P (mg/kg)	Moisture Content (%)	Hydrocarbon Oxidizing Population (mpn/g)	Total Heterotrophic Plate Count (cfu/g)
6/9/94	0	11	7.8	1.5	1.3	2.8	4	11.7	3.30E+03	6.7E+07
6/16/94	7	1	6.8	3.3	1.4	4.7	10.5	5	2.20E+05	1.4E+07
6/23/94	14	32	7.9	2	1.7	3.7	12.3	10.3	1.70E+04	7.5E+07
6/30/94	21	43	7.8	1.7	1.2	2.9	7.2	10.1	3.30E+04	9.6E+07
7/7/94	28	15	7.6	5.2	3.9	9.1	10.8	8.8	4.90E+04	8.4E+07
7/14/94	35	24	7.8	1.3	1.1	2.4	8.6	9.8	2.20E+04	2.3E+07
7/21/94	42	19	8.7	1.3	1.7	3	7	6.4	1.70E+04	1.9E+07
7/28/94	49	49	8.2	1.6	1.3	2.9	3.4	7.6	3.30E+04	5.5E+07
8/4/94	56	5	7.9	1.3	1.1	2.4	4.7	6.9	7.00E+03	3.9E+07
8/11/94	63	53	7.9	1	1.2	2.2	3.8	7.3	2.80E+04	9.9E+07
8/18/94	70	10	7.8	9.7	6.4	16.1	5.6	15.9	1.10E+05	9.9E+07
8/25/94	77	28	7.4	4.3	4.1	8.4	7.1	12.6	3.30E+04	4.8E+07
9/1/94	84	36	8.1	2.8	5.2	8	5	12.7	1.30E+05	9.6E+07
9/8/94	91	31	8.3	5.1	10.4	15.5	4.4	9.6	3.30E+04	4.4E+07
9/15/94	98	2	7.8	1.1	1.4	2.5	6.5	6.9	4.90E+04	1.0E+08
9/22/94	105	17	7.3	1.7	1.2	2.9	4.9	5.2	1.30E+03	3.9E+07

Table 6
Mobil Jalk Fee
Cell #1
Total Recoverable Petroleum Hydrocarbon
in parts per million

Grid Cell Desig-nation	9-Jun-94	16-Jun-94	30-Jun-94	14-Jul-94	28-Jul-94	11-Aug-94	25-Aug-94	8-Sep-94	22-Sep-94
30					270				
31								740	
32		680							
33								660	
34				1600					
35			1500						
36							530		
37				940					
38								380	
39					140				
40		4100							2100
41							340		
42	57								1100
43			990						
44				2100					840
45	600								650
46								800	
47						930			
48			190						
49					700				
50		2900							310
51		1100							
52	110							50	
53						530			
54					500				
Average	**656**	**1885**	**1247**	**1387**	**732**	**649**	**659**	**618**	**967**

Table 6
Mobil Jalk Fee
Cell #1
Total Recoverable Petroleum Hydrocarbon
in parts per million

Grid Cell Desig-nation	9-Jun-94	16-Jun-94	30-Jun-94	14-Jul-94	28-Jul-94	11-Aug-94	25-Aug-94	8-Sep-94	22-Sep-94
1		530							
2			1800						180
3						360			
4				1600					
5							1000		
6	1200								89
7			1600						
8						680			
9				1800					
10								560	
11	1200							270	
12		2000							3200
13			1400						
14							550		
15	1200							630	
16						450			
17	120								570
18					560				
19	260							890	
20	1500						1700		
21						1100			
22					52				
23							340		
24	310			800					
25								1200	
26					2900				630
27				870					
28							150		
29						490			

TABLE 5
POSITIVE WATER SAMPLE ANALYTICAL RESULTS
CALIFORNIA ASSESSMENT MANUAL (CAM) TITLE 22 METALS
IN PARTS PER BILLION (PPB)
MOBIL JALK FEE, SANTA FE SPRINGS, CALIFORNIA

Monitoring Well	Date	CAM Title 22 Metals: Total Threshold Limit Concentration (TTLC)[1,2]			
		Barium	Chromium	Selenium	Zinc
MMW -3	3/1/94	100	11	7	89
	6/22/94	NA[3]	NA	NA	NA
MMW-4	3/1/94	120	11	0.4	56
	6/22/94	NA	NA	NA	NA
MMW-5	3/1/94	58	<10	<5	<20
	6/22/94	NA	NA	NA	NA
CAM Title 22 TTLC	--	1,000	2,500	100	5,000

[1] All detected metals were detected at concentrations below CAM Title 22 Total Threshold Limit Concentrations (TTLCs) and 10 times Soluble Threshold Limit Concentrations (STLCs).

[2] All other CAM metals were below laboratory detection limits in all groundwater samples.

[3] Not Analyzed

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TABLE 4
POSITIVE GROUNDWATER SAMPLE ANALYTICAL RESULTS
IN GROUNDWATER MONITORING WELLS MMW-1 THROUGH MMW-5
VOLATILE ORGANIC COMPOUNDS (VOCs) AND SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)
IN PARTS PER BILLION (PPB)
MOBIL DEWENTER/JORDAN/GREEN, BAKER/HUMBLE, AND JALK FEE,
SANTA FE SPRINGS, CALIFORNIA

Monitoring Well	Date	VOCs (EPA Method 624)[1]						SVOCs (EPA Method 625)		
		1,1-DCE	TCE	Toluene	PCE	Ethyl-benzene	Total Xylenes	2-Methyl-naphthalene	Dimethyl-phthalate	Bis(2-Ethylhexyl) phthalate
MMW-1	9/16/94	<5	11	<5	5	<5	<5	NA[2]	NA	NA
MMW-2[3]	9/16/94	110	<5	<5	<5	<5	<5	NA	NA	NA
MMW-3	3/1/94	10	25	13	5	26	101	320	<10	11
	6/22/94	8	24	<5	<5	<5	<5	NA	NA	NA
	9/16/94	3	12	3	<5	<5	6	NA	NA	NA
MMW-4	3/1/94	<5	18	<5	<5	10	38	<20	100	<20
	6/22/94	<5	16	<5	<5	<5	<5	NA	NA	NA
	9/16/94	<5	6	<5	<5	<5	<5	NA	NA	NA
MMW-5[4]	3/1/94	<5	60	<10	330	11	28	<10	80	<10
	6/22/94	<50	100	<50	930	<50	<50	NA	NA	NA
	9/16/94	<5	82	<5	830	<5	<5	NA	NA	NA

[1] 1,1 DCE = 1,1 Dichloroethene; TCE = Trichloroethene; PCE = Tetrachloroethene.

[2] Not Analyzed

[3] Vinyl Chloride = 33 ppb; 1,2-Dichloroethane = 2 ppb; Benzene = 57 ppb.

[4] Methylene Chloride = 23 ppb

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TABLE 3
POSITIVE GROUNDWATER SAMPLE ANALYTICAL RESULTS
IN GROUNDWATER MONITORING WELLS MMW-1 THROUGH MMW-5
TOTAL PETROLEUM HYDROCARBONS (TPH), pH, AND TOTAL DISSOLVED SOLIDS (TDS)
IN PARTS PER MILLION (PPM)
MOBIL DEWENTER/JORDAN/GREEN, AND BAKER/HUMBLE, AND JALK FEE,
SANTA FE SPRINGS, CALIFORNIA

Monitoring Well	Date	Total Petroleum Hydrocarbon (EPA Method 8015M)	pH (EPA Method 150.1)	Total Dissolved Solids (EPA Method 160.1)
MMW-1	9/16/94	<0.5	7	1,100
MMW-2	9/16/94	<0.5	6.8	1,900
MMW-3	9/16/94	<0.5	7.1	1,700
MMW-4	9/16/94	<0.5	6.9	1,700
MMW-5	9/16/94	<0.5	6.9	1,200